

PATENT ABSTRACTS OF JAPAN

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(54) MULTILAYER FILM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a multilayer film having excellent heat sealability in the case of forming a composite film by providing excellent impact resistance at a low temperature, excellent heat resistance, transparency and extrusion processability without blushing in retorting treatment.

SOLUTION: The multilayer film having a multilayer structure formed of a polyethylene resin at an inner layer side as a sealing surface comprises (a) the inner layer containing resin composition of polyethylene having a density of 0.935g/cm³ or more and ethylene- α -olefin copolymer having a density of 0.870 to 0.910g/cm³, (b) an intermediate layer containing resin composition of ethylene- α -olefin copolymer containing 0.1 to 0.5wt.% of crystal nucleator and a density of 0.935g/cm³ or more, and (c), an outer layer containing polyethylene having a density of 0.935g/cm³ or more.

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CLAIMS

[Claim(s)]

[Claim 1] In the multilayer film of the multilayer configuration which consists of polyethylene system resin which made the inner layer side the sealing surface (a) The resin constituent with which a inner layer consists of with an or more [0.935g //cm] 3 consistency polyethylene, and the ethylene and the alpha olefin copolymer of a consistency 0.870 - 0.910 g/cm³, (b) Multilayer film to which an interlayer is characterized by the resin constituent which consists of with an or more [0.935g //cm] 3 consistency ethylene and an alpha olefin copolymer contained 0.5% of the weight, and the 0.1 - (c) outer layer consisting a crystalline-germ agent of three or more consistency 0.935 g/cm polyethylene.

[Claim 2] (b) The multilayer film according to claim 1 characterized by being the resin constituent with which an interlayer consists of three or more consistency 0.935 g/cm [which contained the crystalline-germ agent 0.1 to 0.5% of the weight] ethylene and an alpha olefin copolymer, and the ethylene and the alpha olefin copolymer of a consistency 0.870 - 0.910 g/cm³.

[Claim 3] (b) The multilayer film according to claim 2 to which the middle class's resin constituent is characterized by for the weight ratios of three or more consistency 0.935 g/cm ethylene and an alpha olefin copolymer, and the ethylene and the alpha olefin copolymer of a consistency 0.870 - 0.910 g/cm³ being 90:10-40:60, and for the consistencies of the resin constituent concerned being three or more 0.930 g/cm, and the melt flow rates measured under the load which are 190 degrees C and 2160g being 0.1-20g / 10 minutes.

[Claim 4] (a) The multilayer film according to claim 1 to 3 to which the resin constituent of a inner layer is characterized by for the weight ratios of with an or more [0.935g //cm] 3 consistency polyethylene, and the ethylene and the alpha olefin copolymer of a consistency 0.870 - 0.910 g/cm³ being 90:10-40:60, and for the consistencies of the resin constituent concerned being three or more 0.930 g/cm, and the melt flow rates measured under the load which are 190 degrees C and 2160g being 0.1-20g / 10 minutes.

[Claim 5] The ethylene and the alpha olefin copolymer of a consistency 0.870 - 0.910 g/cm³ (i) The carbon numbers of an alpha olefin are 3-20, and it is the range whose melt flow rates measured under the load which are (ii) 190 degree C and 2160g are 0.1 - 20g / 10 minutes. The ratio (Mw/Mn) of the weight average molecular weight (Mw) measured with gel permeation chromatography (GPC) and number average molecular weight (Mn) is three or less. (iii) (iv) the relation the temperature (Tm (degree C)) of the maximum peak location of the endoergic curve obtained from measurement of a differential scanning calorimeter (DSC) and the short chain degree (SCB) per [which is called for from measurement of 13 C-NMR spectrum] 1000 carbon numbers are indicated to be by following the (1) formula The multilayer film according to claim 1 to 4 characterized by being the ethylene and the alpha olefin copolymer to fill.

$T_m < -1.8 \times SCB + 138$ (1)

[Claim 6] The multilayer film according to claim 1 to 5 characterized by a multilayer film being a sealant multilayer film for a lamination.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Since this invention is excellent in the shock resistance in low temperature and excellent in thermal resistance in more detail about the multilayer film by which transparency and milkiness were improved, it does not produce milkiness in retorting, but it relates to the multilayer film which is excellent in the heat-sealing nature at the time of moreover considering as transparency, extrusion nature, and a complex film.

[0002]

[Description of the Prior Art] The laminate film for retort food packing is widely used as wrapping of food packing. Conventionally, since retorting conditions are usually around 115 degrees C, the sealant film used for the laminate film used for such a purpose also needs to have the thermal resistance of 115 degrees C or more. Therefore, a polypropylene resin, high-density-polyethylene resin, etc. which are conventionally excellent in thermal resistance and seal nature as a sealant film were used.

[0003] However, since a pouch-packed food is frozen and it circulates recently, in order to prevent the bag tearing by fall in the frozen condition etc., the shock resistance in low temperature is becoming important. For example, when resin with the weak impact strength-proof at the time of low temperature was used as a sealant film like a polypropylene resin, there was a trouble that a package bag carried out bag tearing, at the time of refrigerated transport etc. Although polyethylene is excellent from a shock-proof viewpoint in low temperature, polyethylene is inferior to thermal resistance, since a film melts it with heating, it needs to lower retort temperature, the sterilization time amount it therefore becomes inadequate sterilizing becomes long, and a fault -- working efficiency is bad -- produces it.

[0004] Furthermore, as a polypropylene resin, when the propylene ethylene random copolymer resin is used as a sealant film Sealant layers carry out thermal melting arrival with the heat at the time of retorting, opening nature falls, and there is a fault of being hard coming to take out contents. When the propylene ethylene block copolymer resin and high-density-polyethylene resin were used as a sealant layer, there was a fault of stable heat sealing having been difficult and being easy to generate the bag tearing trouble by the seal omission etc. from the melting point of these resin being high.

[0005] On the other hand, straight chain-like low density polyethylene (ethylene and alpha olefin copolymer) is excellent in transparency, the impact strength at the time of low temperature, and seal nature, and is used as a sealant film of the voile sterilization application of the about [100 degrees C] from the former. However, since the melting point was as low as 125-degree-C order and it was further easy to carry out thermal melting arrival of the sealant layers by retorting at 115 degrees C compared with the case of a propylene ethylene random copolymer, straight chain-like low density polyethylene was not able to be used as a sealant layer of the laminate film for retort food packing.

[0006]

[Problem(s) to be Solved by the Invention] Since this invention is excellent in the shock resistance in low temperature and excellent in thermal resistance, it does not produce milkiness in retorting but offers the multilayer film which is excellent in the heat-sealing nature at the time of moreover considering as transparency, extrusion nature, and a complex film.

[0007]

[Means for Solving the Problem] Since this invention persons excelled [multilayer film / which a inner layer and an interlayer become from a specific resin constituent, and an outer layer becomes from specific resin as a

result of inquiring wholeheartedly, in order to solve the above-mentioned technical problem] in the shock resistance in low temperature and were excellent in thermal resistance, they do not produce milkiness in a retort but came to complete header this invention for excelling in the heat-sealing nature at the time of moreover considering as transparency, extrusion nature, and a complex film.

[0008] Namely, this invention is set to the multilayer film of the multilayer configuration which consists of polyethylene system resin which made the inner layer side the sealing surface. (a) A inner layer With an or more [0.935g //cm] 3 consistency polyethylene And the ethylene and the alpha olefin copolymer of a consistency 0.870 - 0.910 g/cm³ (This is hereafter called [A]) The resin constituent and the (b) interlayer who consist of (this is hereafter called [B]) contained the crystalline-nucleus agent 0.1 to 0.5% of the weight. Let the resin constituent which consists of with an or more [0.935g //cm] 3 consistency ethylene and an alpha olefin copolymer (this is hereafter called [A']), and the multilayer film characterized by the (c) outer layer consisting of three or more consistency 0.935 g/cm polyethylene [A] be summaries.

[0009] In this invention, a inner layer (a) consists of a resin constituent of [A] and [B], gives thermal resistance by using with an or more [0.935g //cm] 3 consistency polyethylene as [A], and gives film-proof impact nature and a seal by using ethylene and an alpha olefin copolymer as [B].

[0010] and an interlayer (b) -- a crystalline-nucleus agent -- the resin constituent containing 0.1 - 0.5 % of the weight which consists of [A'] -- it is -- further -- desirable -- a crystalline-nucleus agent -- it is the resin constituent containing 0.1 - 0.5 % of the weight which consists of [A'] and [B]. The crystalline-nucleus agent added by this interlayer gives transparency and the milkiness-proof effectiveness. Moreover, an outer layer (c) is a layer which has the role which prevents the bleed out of the crystalline-germ agent which consisted of [A] and was added to the middle class (b).

[0011] A consistency is polyethylene of three or more [0.935g //cm], and [A] used for a inner layer and an outer layer in this invention is not desirable from the thermal resistance of the multilayer film obtained getting worse, when a consistency uses the polyethylene of less than [0.935g //cm] three.

[0012] And with [a consistency] three [or more / 0.935g //cm] in this invention, it can use, even if it is an ethylene homopolymer or the copolymer of ethylene and a with a carbon numbers of three or more alpha olefin, and such polyethylene can be obtained from the polymerization method which used the below-mentioned metallocene system catalyst, or the conventionally well-known polymerization method using a conventionally well-known Ziegler type catalyst.

[0013] And although a consistency should just be polyethylene of three or more [0.935g //cm], as for [A] used for a inner layer and an outer layer in this invention, as an upper limit of a consistency, a three or less 0.950 g/cm thing is usually used. When using for a inner layer and an outer layer, even if each differs, even when it is the same, it is good.

[0014] Moreover, since it excels in a flow and workability at the time of multilayer film shaping and the film-proof impact nature of the obtained multilayer film becomes high, as for the polyethylene of [A] used in this invention, it is desirable that it is the range whose melt flow rates measured under the load (190 degrees C and 2160g) are 0.1 - 20g / 10 minutes.

[0015] The consistencies of [A'] used for the middle class in this invention are three or more 0.935 g/cm ethylene and an alpha olefin copolymer. When a consistency uses the ethylene and the alpha olefin copolymer of less than [0.935g //cm] three, it is not desirable from the thermal resistance of the multilayer film obtained getting worse.

[0016] [B] used for a inner layer and the middle class in this invention is ethylene and an alpha olefin copolymer. And when using for a inner layer and the middle class, even if each differs, even when it is the same, it is [that what is necessary is just ethylene and an alpha olefin copolymer] good [[B] used for a inner layer and the middle class in this invention].

[0017] As an alpha-olefin by which copolymerization is carried out to the ethylene of [A'] and [B], the thing of carbon numbers 3-20 is mentioned, for example, they are 1-butene, 1-pentene, 1-hexene, 1-octene, 1-heptene, 4-methyl pentene -1, and 4-methyl hexene. - 1, 4, and 4-dimethyl pentene -1, octadecene, etc. are mentioned. And it is 1-hexene to use 1-hexene, 1-octene, 1-heptene, and 4-methyl pentene -1 also in these alpha-olefin desirable especially preferably. [B] used in this invention is the ethylene and an alpha olefin copolymer which has a consistency in the range of 0.870 - 0.910 g/cm³.

[0018] Furthermore, since the multilayer film excellent in film-proof impact nature is obtained, as for especially

this ethylene and alpha olefin copolymer, it is desirable that the ratio (M_w/M_n) of the weight average molecular weight (M_w) measured with gel permeation chromatography (GPC) and number average molecular weight (M_n) is three or less.

[0019] Moreover, since the multilayer film in which film-proof impact nature was especially excellent is obtained from having uniform presentation distribution, as for this ethylene and alpha olefin copolymer, it is desirable that the temperature (T_m (degree C)) of the maximum peak location of the endoergic curve obtained from measurement of a differential scanning calorimeter (DSC) and the short chain degree (SCB) per [which is called for from measurement of ^{13}C -NMR spectrum] carbon number 1000 are what fills the relation of (1) type.

[0020]

$$T_m < -1.8 \times \text{SCB} + 138 \quad (1)$$

If [B] used in this invention is ethylene and an alpha olefin copolymer, it can use anythings. And it is desirable to use the ethylene and the alpha olefin copolymer with which are especially satisfied of the above-mentioned property. Such ethylene and an alpha olefin copolymer can ionize the catalyst which combined the metallocene compound which the ligand which has one piece or two cyclopentadienyl frames configured in a periodic-table IVb-VIb group's transition metals, for example, titanium, zirconium, or hafnium, and alumoxane or the above-mentioned metallocene compound, and a metallocene compound, and can manufacture them by using the catalyst system which makes a basic constituent a compound with possible making a cationic metallocene compound generate.

[0021] As the manufacture approach of the ethylene and the alpha olefin copolymer using the above-mentioned catalyst system, a gaseous-phase method, slurry method, a solution method, a high-pressure ionic polymerization method, etc. can be mentioned. It is desirable to manufacture by the solution method which performs a polymerization at the temperature to 280 degrees C more than the melting point of the ethylene and the alpha olefin copolymer generated especially, and the high-pressure ionic polymerization method, and it is desirable to manufacture by the high-pressure ionic polymerization method as the ethylene and an alpha olefin copolymer used especially for this invention. In addition, a high-pressure ionic polymerization method is a continuous manufacturing method of the ethylene system polymer with which 200kg/cm² or more of 130-250 degrees C of pressures which are indicated by JP,56-18607,A and JP,58-225106,A each official report is preferably performed especially under a 150-200-degree C reaction condition 300-2000kg/cm² and the temperature of 125 degrees C or more.

[0022] In this invention, a crystalline-nucleus agent is preferably used for an interlayer 0.15 to 0.35% of the weight 0.1 to 0.5% of the weight. Although there will be especially no limit as this crystalline-nucleus agent if it acts as a crystalline-nucleus agent, an organic system crystalline-nucleus agent can usually use it preferably. And it is desirable to use p-tert-butyl benzoic-acid aluminum especially, for example from the thing which a sodium benzoate, benzoic-acid aluminum, a p-tert-butyl sodium benzoate, p-tert-butyl benzoic-acid aluminum, adipic-acid sodium, adipic-acid aluminum, etc. are mentioned as an organic carboxylic-acid metal salt, and is been hard to generate an odor etc.

[0023] And when the content in an interlayer is less than 0.1 % of the weight, the transparency or the milkiness-proof effectiveness of a multilayer film acquired becomes inadequate. On the other hand, when exceeding 0.5 % of the weight, the problem that a crystalline-germ agent becomes easy BURITO [middle class] may occur.

[0024] The multilayer film of this invention from having the outstanding thermal resistance and a processing moldability at the time of manufacture The inner layer under the configuration is the resin constituent obtained in [A]:[B] = 90:10-40:60 (weight ratio). It is desirable to consist of a resin constituent whose melt flow rates the consistencies of this resin constituent are three or more 0.930 g/cm, and are 0.1-20g / 10 minutes. When the interlayer under the configuration uses the constituent of [A'] and [B], it is the resin constituent obtained in [A']: [B] = 90:10-40:60 (weight ratio). It is desirable to consist of a resin constituent whose melt flow rates the consistency of this resin constituent is three or more [0.930g //cm], and are 0.1-20g / 10 minutes.

[0025] The multilayer film of this invention may add the auxiliary addition component generally used, for example, an anti-oxidant, lubricant, the anti-blocking agent, the antistatic agent, the neutralizer, etc., unless it deviates from the purpose of this invention.

[0026] The multilayer film of this invention can be fabricated as a multilayer film by being able to obtain by the manufacture approach of a common film, for example, presenting tubular blown film processing or T die film

processing, after carrying out melting mixing using a single screw extruder, a twin screw extruder, a Banbury mixer, etc. and using [A], [B], a crystalline-germ agent, etc. as a resin constituent.

[0027] Since it has the outstanding seal nature and film-proof impact nature, especially the multilayer film of this invention is used as a sealant multilayer film for a lamination.

[0028]

[Example] Hereafter, although an example explains this invention to a detail further, this invention is not limited to these examples.

[0029] - synthetic example - diphenylmethylen (cyclopentadienyl) (fluorenyl) zirconium dichloride: -- N and the catalyst which consists of N-dimethyl ANIRIUMU tetrakis (pentafluorophenyl) borate:triisobutylaluminum =1:2:250 (mole ratio) were prepared, copolymerization of ethylene and 1-hexene was performed using this catalyst system by the polymerization temperature of 150-175 degrees C, and polymerization pressure force 900 kgf/cm², and ethylene, 1-hexene copolymer (1), and ethylene and 1-hexene copolymer (2) were obtained.

[0030] The ethylene, 1-hexene copolymer (1), and the ethylene and 1-hexene copolymer (2) which were obtained were measured by the following approach.

[0031] Consistency: It is JIS about what heat-treated the resinous principle with 100-degree C hot water for 1 hour. Based on K6760 (1981), it measured using density gradient tubing kept at 23 degrees C.

[0032] Melt flow rate (MFR): JIS It measured based on K7210 (1976).

[0033] weight-average-molecular-weight (Mw) and number-average-molecular-weight (Mn): -- Mw and Mn -- Nihon Millipore 150C It measured with the gel permeation chromatography (GPC) using ALC/GPC (column: -- the TOSOH CORP. make and GMHHR-H(S)7.8mmIDx30cm -- 3, solvent:1,2,4-trichlorobenzene, temperature:140 degree-C, and flow rate:1.0ml a part for /and impregnation concentration of 1mg / 1ml (injection rate 300microl)). In addition, the column elution volume was proofread by the universal calibration method using the standard polystyrene by TOSOH CORP.

[0034] Short-chain degree: The alt.dichlorobenzene was computed using the solution used as the solvent by 100MHz and 13 C-NMR spectrum (JEOL Co., Ltd. make JNM GX400) measurement.

[0035] Melting point: It measured using the differential scanning calorimeter (DSC) (PerkinElmer, Inc. make DSC-7). After carrying out melting of the sample for 5 minutes at 200 degrees C in a DSC furnace, the temperature (Tm (degree C)) of the maximum peak location of the endoergic curve which is made to carry out a temperature up the rate for 10-degree-C/, and is obtained about the sample which lowers and solidified temperature to 30 degrees C the rate for 10-degree-C/(crystallization) was measured.

[0036] The obtained result is shown in Table 1 (ethylene and 1-hexene copolymer (1)) and 2 (ethylene and 1-hexene copolymer (2)).

[0037] - the result of having performed the same measurement as a synthetic example for commercial item ethylene and 1-hexene copolymer (3), and (TOSOH CORP. make, trade name NIPORON-Z;ZF 260-1, consistency 0.935 g/cm³, and melt flow rate 2.0g / 10 minutes) is shown in the example of reference - Table 3.

[0038] The result of having performed the same measurement as a synthetic example for commercial item ethylene and 1-butene copolymer (4), and (TOSOH CORP. make, trade name LUMITAC;22-1, consistency 0.900 g/cm³, and melt flow rate 2.0g / 10 minutes) is shown in Table 4.

[0039] As an object for example 1 inner layers, the ethylene and 1-hexene copolymer (1), and the ethylene and 1-hexene copolymer (2) which were obtained in the synthetic example are considered as the presentation of (1): (2) =85:15. As opposed to this constituent 100 weight section The anti-oxidant (Ciba-Geigy make, trade name Irganox1076) 0.15 weight section, Melting mixing of the anti-oxidant (Ciba-Geigy make, trade name Irgafos168) 0.10 weight section, the silica 0.3 weight section as an anti-blocking agent, and the erucic-acid amide 0.04 weight section as lubricant was carried out, and the resin constituent for inner layers was obtained.

[0040] The consistencies of this inner layer resin constituent were 0.931 g/cm³ and melt flow rate 2.3g / 10 minutes.

[0041] As the middle class, melting mixing of the p-tert-butyl benzoic-acid aluminum (product made from shell chemistry) 0.2 weight section (inside of a resin constituent 0.2 % of the weight) was carried out as a crystalline-germ agent at the above-mentioned resin constituent 100 weight section for inner layers, and the resin constituent for the middle class was obtained.

[0042] The consistencies of this resin constituent for interlayers were 0.931 g/cm³, and melt flow rates were 2.3g / 10 minutes.

[0043] As an object for outer layers, the anti-oxidant (Ciba-Geigy make, trade name Irganox1076) 0.15 weight section, the anti-oxidant (Ciba-Geigy make, trade name Irgafos168) 0.10 weight section, the silica 0.3 weight section as an anti-blocking agent, and the erucic-acid amide 0.04 weight section as lubricant were added to the ethylene and 1-hexene copolymer (1) 100 weight section obtained in the synthetic example, melting mixing was carried out, and the resin constituent for outer layers was obtained.

[0044] The consistencies of this resin constituent for outer layers were 0.935 g/cm³ and melt flow rate 2.0g / 10 minutes.

[0045] The multilayer film with a thickness of 60micro which performed corona treatment of surface tension 42 dyn/cm was obtained by carrying out film shaping of each object for inner layers, the object for interlayers, and the resin constituent for outer layers which were obtained at the working temperature of 180 degrees C, and the blow-up ratio 1.6 using the inflation multilayer making machine equipped with 175mm of diameters of a dice, and a dice lip path clearance 2.0mm multilayer dice.

[0046] About the obtained multilayer film, measurement and evaluation were performed by the following approach.

[0047] Haze (haze): It is ASTM as an index of transparency. It measured based on D1003.

[0048] deltaHaze: It carried out by the following approaches as an index of thermal resistance and milkiness nature.

[0049] The laminate film was obtained by performing aging for a biaxial extension polyamide film with a thickness [of a base material] of 15micro, and the obtained multilayer film (interlayer: inner layer : outer layer = 1:2:1) for two days under 40-degree-C ambient atmosphere after dry laminate processing using the adhesives for ester system dry laminates. The purified water deaerated into the 10cmx10cm bag which heat sealed and created this laminate film was put in, and as air was not put in, it was heat sealed, and it was sealed. Next, the bag filled up with purified water is heated with a retort elevated-temperature autoclave (Hisaka Works, Ltd.), and processing of a retort is performed for 115 degrees C and 30 minutes. Extent of milkiness by this actuation was expressed with the difference (deltaHaze) of Hayes before and behind a retort.

[0050] It is shown that milkiness is small and thermal resistance is so good that the numeric value of deltaHaze is small.

[0051] Milkiness: Viewing estimated aggravation (milkiness condition) of the transparency of a film.

[0052] Valuation basis O:albinism-less **: They are those with albinism slightly. Welding [-proof / with x:albinism] nature: The existence of inside welding estimated.

[0053] Valuation basis O: With no welding Deformation with x:welding: The existence of deformation (a wrinkle, distortion, etc.) of a film estimated.

[0054] Valuation basis O: With no deformation Shock resistance in low temperature with x:deformation: Brine was put into the 15cmx20cm bag created by the above-mentioned approach (2), and as air was not put in, it was heat sealed, and it was sealed. It asked for the count of fall until adjust these ten bags, it makes a concrete floor line carry out free fall from height of 1m after cooling it in temperature of 0 degree C in a low-temperature thermostatic chamber and all bags carry out bag tearing. A measurement result is shown in Table 5.

[0055] The multilayer film was obtained by the same approach as an example 1 except having not used ethylene and 1-hexene copolymer (2) for the resin constituent for the example 2 middle class.

[0056] Evaluation measurement of the obtained multilayer film was carried out by the same approach as an example 1. The obtained result is shown in Table 5.

[0057] In example of comparison 1 example 1, the same measurement and evaluation as an example 1 were performed except for the ethylene and 1-hexene copolymer (2), and the crystalline-nucleus agent of Table 2 from the middle class.

[0058] The multilayer film was obtained by the same approach as an example 1 except having used commercial item ethylene and 1-hexene copolymer (3), and (the TOSOH CORP. make and trade name NIPORON-Z;ZF 260-1) for the object for example of comparison 2 inner layers, the object for the middle class, and the resin constituent for outer layers, and having not used a crystalline-nucleus agent for the resin constituent for the middle class.

[0059] Evaluation measurement of the obtained multilayer film was carried out by the same approach as an example 1. The obtained result is shown in Table 5.

[0060] the object for example of comparison 3 inner layers, the object for the middle class, and the resin

constituent for outer layers -- instead of [of ethylene and 1-hexene copolymer (1)] -- commercial item ethylene and 1-hexene copolymer (3) (the TOSOH CORP. make --) trade name NIPORON-Z;ZF 260-1 -- using -- instead of [of ethylene and 1-hexene copolymer (2)] -- commercial item ethylene and 1-butene copolymer (3) (the TOSOH CORP. make --) The multilayer film was obtained by the same approach as an example 2 using trade name LUMITAC;22-1 except having not used a crystalline-nucleus agent for the resin constituent for interlayers. The consistencies of the resin constituent for inner layers at that time were 0.930 g/cm³, and melt flow rates (MFR) were 2.0g / 10 minutes.

[0061] Evaluation measurement of the obtained multilayer film was carried out by the same approach as an example 1. The obtained result is shown in Table 5.

[0062]

[Table 1]

エチレン・1-ヘキセン共重合体 (1) (合成例)

記号	密度 (g/cm ³)	MFR (g/10分)	Mw/Mn	短鎖分岐数 (/1000C)	融点 (Tm) (℃)
(1)	0.935	2.0	1.8	5.4	126

[0063]

[Table 2]

エチレン・1-ヘキセン共重合体 (2) (合成例)

記号	密度 (g/cm ³)	MFR (g/10分)	Mw/Mn	短鎖分岐数 (/1000C)	融点 (Tm) (℃)
(2)	0.906	3.9	1.8	20.2	95

[0064]

[Table 3]

エチレン・1-ヘキセン共重合体 (3) (市販品)

記号	密度 (g/cm ³)	MFR (g/10分)	Mw/Mn	短鎖分岐数 (/1000C)	融点 (Tm) (℃)
(3)	0.935	2.0	4.8	8.9	126

[0065]

[Table 4]

エチレン・1-ブテン共重合体 (4) (市販品)

記号	密度 (g/cm ³)	MFR (g/10分)	Mw/Mn	短鎖分岐数 (/1000C)	融点 (Tm) (℃)
(4)	0.900	2.0	5.0	28.4	115

[0066]

[Table 5]

	原料組成			レトルト後			透明性 Δヘーズ	耐衝撃 回数
	外層	中間層	内層	外觀（目視）				
				白化	融着	変形		
実施例 1	(1)	(1) (2) 核剤	(1) (2)	○	○	○	8	20
実施例 2	(1)	(1) (2) 核剤	(1) (2)	△	○	○	11	17
比較例 1	(1)	(1)	(1) (2)	△	○	○	14	14
比較例 2	(3)	(3)	(3)	×	○	○	29	10
比較例 3	(3)	(3)	(3) (4)	×	×	△	21	12

(1) : (2) = 85 : 15 (重量比)

結晶核剤：p-tert-ブチル安息香酸アルミニウム 0.2重量%配合

(3) : (4) = 85 : 15 (重量比)

[0067]

[Effect of the Invention] Since the multilayer film in this invention is excellent in the shock resistance in low temperature and excellent in thermal resistance, it does not produce milkiness in retorting, but is excellent in the heat-sealing nature at the time of moreover considering as transparency, extrusion nature, and a complex film as stated above.

[0068]

[Translation done.]